

Appln No. 09/778,992

Amdt date September 13, 2004

Reply to Office action of July 13, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. - 7. (Canceled)

8. (Previously Presented) An optical switch comprising:
a plurality of optical to electronic (OE) interface units for receiving a plurality of demultiplexed signals respectively, each OE interface unit comprising:

an OE converter for converting a respective demultiplexed signal to a corresponding electrical signal, and

a data and clock recovery circuit for recovery of data and corresponding clocking information from the corresponding electrical signal and outputting said data as a respective recovered electrical signal, said data and clock recovery circuit recovering data streamed at multiple different clock rates and multiple different protocols;

an electronic switch for transmitting each of the respective recovered electrical signals to at least one of a plurality of output ports under control of an external control signal; and

a plurality of electronic to optical (EO) interface units coupled to said plurality of output ports, respectively.

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9. (Previously Presented) The switch as claimed in claim 8, wherein each of the plurality of EO interface units comprises:

a data and clock recovery circuit for recovery of data and corresponding clocking information from the respective recovered electrical signal and outputting said data as a respective second data stream, said data and clock recovery circuit recovering data streamed at multiple different clock rates and multiple different protocols; and

an EO converter for converting the respective second data stream to a corresponding optical output stream.

10. (Previously Presented) The switch as claimed in claim 9, wherein each of the plurality of EO converters comprises an externally modulated semiconductor laser source having wavelength specific output characteristics.

11. (Previously Presented) The switch as claimed in claim 9, wherein each of the plurality of EO converters comprises a directly modulated semiconductor laser source having wavelength specific output characteristics.

12. (Previously Presented) The switch as claimed in claim 8, wherein each data and clock recovery circuit extracts signal information for signal processing at multiple different clock rates and multiple different protocols.

13. (Previously Presented) The switch as claimed in claim 8, wherein each data and clock recovery circuit extracts

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signal information for performance monitoring at multiple different clock rates and multiple different protocols.

14. (Currently Amended) The switch as claimed in claim 13, wherein the data and clock recovery circuit ~~further comprising~~ comprises a serial-parallel converter and a memory element having a look-up table stored therein, and the data and clock recovery circuit serial-parallel converts the electrical signals and compares the converted signals with data in the looked-up table for illegal symbol detection in the ~~extracted signal information~~ performance monitoring.

15. (Currently Amended) The switch as claimed in claims 13 or 14, wherein the performance monitoring ~~comprises determining~~ determines a packet-rate of one or more of the respective electrical signals.

16. (Previously Presented) The switch as claimed in claims 8 or 9, further comprising at least a first demultiplexer for demultiplexing a wavelength division multiplexed signal into a respective demultiplexed signal; and at least a first multiplexer interconnected to the plurality of EO interface units for multiplexing optical output streams from a respective EO interface unit together to form a combined optical data stream output.

17. (Currently Amended) An optical switch comprising:
a plurality of optical to electronic (OE) interface units for converting a plurality of demultiplexed optical signals to a plurality of corresponding electrical signals;

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an electronic switch for transmitting a respective electrical signal to at least one of a plurality of output ports; and

a plurality of electronic to optical (EO) interface units at said plurality of output ports, each EO interface unit comprising:

a first port for receiving a respective externally generated laser signal,

a modulator for modulating the respective received laser signal, and

a second port for passing the respective modulated laser signal to an external multiplexer for forming a combined optical data stream output,

wherein each OE interface unit further comprises:

an OE converter for converting a respective demultiplexed signal to a corresponding electrical signal; and

a data and clock recovery circuit for recovery of data and corresponding clocking information from the corresponding electrical signal and outputting said data as a respective recovered electrical signal, said data and clock recovery circuit recovering data streamed at multiple different clock rates and multiple different protocols,

wherein the electronic switch transmits the respective recovered electrical signal to the at least one of the plurality of output ports.

18-22. (Canceled)

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23. (Previously Presented) A fault tolerant optical switch apparatus comprising:

at least a first demultiplexer for demultiplexing a wavelength division multiplexed signal into corresponding spatially separated plurality of demultiplexed signals;

at least a first multiplexer for multiplexing a plurality of optical output streams to form a combined optical data stream output;

a first and a second optical switch, each optical switch comprising:

a plurality of optical to electronic (OE) interface units for receiving a plurality of demultiplexed signals respectively, each OE interface unit comprising:

an OE converter for converting a respective demultiplexed signal to a corresponding electrical signal, and

a data and clock recovery circuit for recovery of data and corresponding clocking information from the corresponding electrical signal and outputting said data as a respective recovered electrical signal, said data and clock recovery circuit recovering data streamed at multiple different clock rates and multiple different protocols;

an electronic switch for transmitting each of the respective recovered electrical signals to at least one of a plurality of output ports under control of an external control signal; and

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a plurality of electronic to optical (EO) interface units coupled to said plurality of output ports, respectively,
wherein the first demultiplexer and the first multiplexer are interconnected to the first and the second optical switches to provide fault tolerant operation.

24. (Currently Amended) A fault tolerant optical switch apparatus comprising:

at least a first demultiplexer for demultiplexing a wavelength division multiplexed signal into corresponding spatially separated plurality of demultiplexed signals;

at least a first multiplexer for multiplexing a plurality of optical output streams to form a combined optical data stream output;

a first and a second optical switch, each optical switch comprising:

a plurality of optical to electronic (OE) interface units for converting a plurality of demultiplexed optical signals to a plurality of corresponding electrical signals;

an electronic switch for transmitting a respective electrical signal to at least one of a plurality of output ports; and

a plurality of electronic to optical (EO) interface units at said plurality of output ports, each EO interface unit comprising:

a first port for receiving a respective externally generated laser signal,

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a modulator for modulating the respective received laser signal, and
a second port for passing the respective modulated laser signal to an external multiplexer for forming a combined optical data stream output, wherein the first demultiplexer and the first multiplexer are interconnected to the first and the second optical switches to provide fault tolerant operation,
wherein each OE interface unit further comprises:
an OE converter for converting a respective demultiplexed signal to a corresponding electrical signal; and
a data and clock recovery circuit for recovery of data and corresponding clocking information from the corresponding electrical signal and outputting said data as a respective recovered electrical signal, said data and clock recovery circuit recovering data streamed at multiple different clock rates and multiple different protocols,
wherein the electronic switch transmits the respective recovered electrical signal to the at least one of the plurality of output ports.

25. (Previously Presented) A fault tolerant optical switch apparatus comprising:

at least a first demultiplexer for demultiplexing a wavelength division multiplexed signal into corresponding spatially separated plurality of demultiplexed signals;

at least a first multiplexer for multiplexing a plurality of optical output streams to form a combined optical data stream output;

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a first and a second optical switch, each optical switch comprising:

- a plurality of optical to electronic (OE) interface units for converting a plurality of demultiplexed optical signals to a plurality of corresponding electrical signals;

- an electronic switch for transmitting a respective electrical signal to at least one of a plurality of output ports under control of an external control signal;

- a plurality of electronic to optical (EO) interface units at said output ports; and

- a plurality of tunable laser sources,

- wherein each EO interface unit comprises:

- a first port for receiving a laser signal from a respective tunable laser source,

- a modulator for modulating the respective received laser signal, and

- a second port for passing the respective modulated laser signal to an external multiplexer for forming a combined optical data stream output,

wherein the first demultiplexer and the first multiplexer are interconnected to the first and the second optical switches to provide fault tolerant operation.